

SCIENCE

And Technology Program



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During its history, the Bureau of Reclamation has designed and constructed a large number of small irrigation diversion dams throughout the Western United States. Most of these diversion dams reside on rivers that are home to mainly non-game fish species. Thus, little attention has been focused on the fishery impacts imposed by these barriers. Many of these diversion dams are approaching 100 years of age, and only now are we realizing the detrimental impact small dams have on many native fish species. Recent declines of native western fish species have resulted in numerous listings of species as threatened or endangered under State and Federal laws. During the past 100 years, some 21 species and sub-species among 6 fish families have become extinct from the 17 Western States, and some 64 species and sub-species are now threatened or endangered. Although not wholly responsible for the decline, barriers to habitat and spawning migration are known contributors. The research study focuses on the design of fish passes for non-salmonid fish indigenous to rivers in the Western United States. Experience has shown that standard designs of fish ladders developed for salmon are often poorly suited for other native species.

To use a combination of laboratory and field studies with the goal of developing better designs and guidelines for incorporating fish passage for existing diversion dams. Both structural and riprap channel forms of fish passes are being studied. The main objectives of the study will be identifying fish passage efficiency as a function of fish pass slope, bottom roughness, large scale flow turbulence, and variations in entrance and exit water surface elevations.

In 1999, the research focused on developing predictive algorithms that could be used with standard backwater modeling software to aid in the design of roughened channels with rock weirs and baffled fishways. The design approach was used to design a roughened channel fishway for the Huntley Irrigation Project near Billings, Montana. A fish passage and hydraulic evaluation of the prototype fishway is scheduled for the summer of 2000.

In conjunction with this work, a cooperative study with the University of Colorado was conducted to investigate the hydraulic drag encountered by fish with large dorsal keels. The objective was to determine if these types of fish use their unusual body form to enhance swimming stability in turbulent flow conditions. These data will help in identifying fish passage criteria for these types of fish species.

USBR Montana Area Office, Montana Fish Wildlife and Parks, U.S. Fish and Wildlife Service, Huntley Irrigation District, Lower Yellowstone Irrigation Project, USBR Lahontan Area Office, USBR Klamath Falls Area Office, and the University of Colorado.

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